VOLUME VII APRIL-JUNE, 1932 No. 2

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PACIFIC OCEANIC FISHERY
INVESTIGATIONS

JOURNAL

OF THE

Pan-Pacific Research Institution

A Periodical Record of Investigations Bearing on Problems of Food Production, Distribution, Conservation and Consumption, as well as on Public Health, and Race and Population Problems as Related to the Countries Bordering on the Pacific.

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(Illustrated)

By Otto Degener
Botanist, University of Hawaii, 1925-27.
Naturalist, Hawaii National Park, 1929.

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AT PRESENT PUBLISHED QUARTERLY AT HONOLULU, HAWAII
BY THE
PAN-PACIFIC UNION

More frequent publication as acceptable material is contributed.

BIDENS ASYMMETRICA

a, flowering and fruiting branch, X0.66; *b*, a tripartite leaf, X0.66; *c*, exterior involucral bract, X4; *d*, interior involucral bract, X4; *e*, ligule, X4; *f*, palea, X4; *g*, disc floret, X4; *h*, a 1-awned and *i*, a 2-awned achene, X4; all from Abbé Faurie 960, cotypes in Hb. Brit. Mus. and Hb. Deless.

Kokoolau, the Hawaiian Tea

With a key to all species of *Bidens* known from the Hawaiian Islands and descriptions of a few representative kinds

OTTO DEGENER, B.S., M.S.
Author of "Plants of Hawaii National Park"

Long before the *haole,* or white man, visited the Hawaiian Islands, the natives brewed several kinds of tea from local plants. The choicest, still drunk by many a Hawaiian to this day, was made from various species of *Bidens,* herbs known in the vernacular as *kokoolau.*[1]

The Hawaiians in gathering their supply of tea generally tried to injure the *kokoolau* plant as little as possible. They were careful not to uproot it, but merely plucked its leaves and possibly a few of the young shoots. These were then allowed to dry until crisp, and stored away for future use.

To make their tea, the ancient Hawaiians were obliged to follow a novel procedure. As they possessed neither earthenware nor metal receptacles but only calabashes laboriously hollowed out from wood, or fashioned out of coconuts or ripened gourds, they were unable to boil their tea by the simple method of placing it in a vessel over a fire. Instead, they partly filled their calabash with water and added the correct amount of dried *kokoolau.* Then they took a clean, white stone, called *oahi,* which had been heated in the fire, and dropped this into the liquid to bring it to the boiling point. After the tea had simmered for the proper length of time it was strained, if necessary, through a sieve of coconut husk or fiber before serving. It was drunk plain or sweetened with the juice of the native white-stemmed sugar cane, *ko-kea.* This tea has a pleasing flavor, and by the Hawaiians is considered a valuable tonic.

The Hawaiians knew of several different kinds of *kokoolau,* but they never realized that at least fifty species would be recognized and carefully described by the *haole.* Three of these species, of which the Spanish Needle or Beggar-Ticks (*Bidens pilosa* L.) is by far the commonest, were introduced accidentally from foreign shores since the coming of Captain Cook. The others are peculiar to these islands, not a single one being found elsewhere.

The distribution of these endemic species is extremely interesting. Most of them (*B. graciloides* Sherff) grow on the drier foothills of our mountain ranges, one (*B. campylotheca* var. *pentamera* Sherff) grows to an elevation of 8,000 or more feet, while another (*B. Hillebrandiana* [Drake del Cast.] Degener) is very tolerant of salt and is found along the shore where the ocean spray may reach it on stormy days.

Some kinds (*B. Menziesii* [Gray] Sherff) are found on two islands of this group, while the great majority are limited to a single island, or even to a single valley (*B. populifolia* Sherff) or mountain (*B. personans* Degener & Sherff). Some (*B. sandvicensis* Less.) are very common, while others (*B. salicoides* Sherff) are extremely rare or (*B. cuneata* Sherff) have already become extinct.

The following pages, extracted from the manuscript of the writer's *Flora Hawaiiensis* or "New Illustrated Flora of the Hawaiian Islands," give the characteristics of the genus *Bidens* with a key by which all species known from the Islands can be identified,[2] and also describe and figure a few of these species. We owe this knowledge largely to the careful researches of Prof. Earl E. Sherff of Field Museum, Chicago.

[1] Incorrectly given as *koolau, kokolau* and *kookoolau* in some publications.

[2] Continued diligent search in the Islands will undoubtedly bring additional species of *Bidens* to light. The writer will greatly appreciate receiving any specimens that do not conform to the present key. P. O. Box 1133, Honolulu.

COMPOSITAE
COMPOSITE FAMILY

***BIDENS** L. Sp. Pl. 831. 1753.

Campylotheca Cass in Dict. Sc. Nat. 51:476. 1827.

Plants herbaceous to shrubby, annual or perennial, erect or procumbent or even scandent, glabrous or pilose; stems terete or angulate, commonly striate. Principal leaves opposite or rarely verticillate in threes, entire or toothed or incised or once or twice or thrice ternately or pinnately dissected; the upper sometimes alternate. Heads sometimes medium-sized or rather large and solitary at ends of branches or in forked clusters; sometimes smaller and more numerous, irregularly corymbose-paniculate; sometimes heterogamous, radiate, the ray florets uniseriate, neuter or more rarely pistillate, the florets of the disc hermaphrodite and fertile; sometimes (when ray florets are absent) homogamous. Involucre more often campanulate or subhemispherical; bracts commonly 2- (more rarely 3- to 4-) seriate, at base often shortly connate (in two African species the inner connate one-fourth to half-way up), the outer more often herbaceous or sometimes short or sometimes expanded into elongate (rarely also decompound) leaves, the inner commonly membranaceous more often hyaline or yellowish along the margins. Ligulate florets commonly white or yellow or more rarely red, the spreading blade entire or more often denticulate. Chaff scales narrow, flattish, subtending the perfect florets. Florets of disc having regular and tubular corolla, the cylindraceous or urticillate limb rarely 4- or commonly 5-toothed. Anthers at base entire or sagittate with small smooth auricles. Styles of perfect florets having branches hirtous above, tipped with short acute or longer subulate appendages. Achenes obcompressed or 3- to 4-angled, obovate-oblong or cuneate or more or less linear, smooth or ciliate or more or less covered with short antrorse or more rarely retrorse hairs (these sometimes grown from papillae), marginally very rarely tuberculate- or submembranaceous-winged, apically often attenuate but not distinctly rostrate, sometimes awnless or sometimes at or under the apex itself armed with 1-8 awns which are rigid and commonly persistent and more or less (antrorsely or retrorsely) barbellate or aculeolate or very rarely reduced to small glands.

Type Species: *Bidens tripartita* L.

Name derived from the Latin for *two* and *tooth* in reference to the biaristate character of the fruit of some species.

Containing 208 known species; widely distributed.

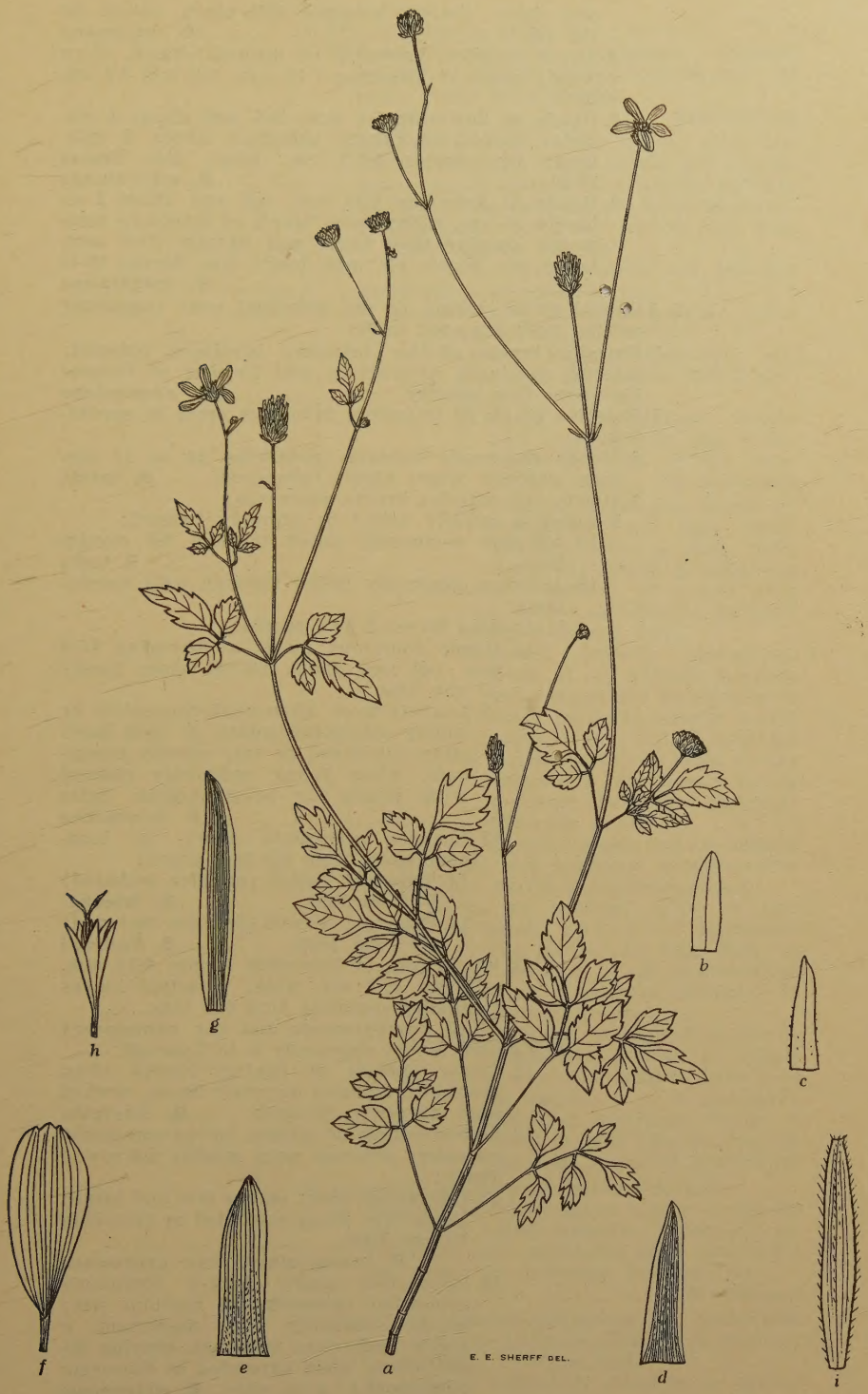
* Entire genus contributed jointly by Otto Degener and Earl E. Sherff.

KEY TO LOCAL SPECIES OF BIDENS

1. Introduced species, occurring in wet places or as weeds in cultivated places, dry pastures, etc.:
   2. Heads conspicuously radiate, achenes cuneate and 2- to 4-awned; plants of swampy situations; probably no longer found in the Islands ..... **B. laevis**
   2. Heads discoid or only obscurely radiate:
      3. Leaves bipinnate, achenes commonly somewhat recurved-falcate and commonly 4-awned, ray florets bright yellow; common on Island of Hawaii ..... **B. cynapiifolia**
      3. Leaves pinnately 3- to 5-parted, achenes commonly straight and commonly 2- to 3-awned; very common:
         4. Heads discoid ..... **B. pilosa**
         4. Heads minutely radiate; ray florets almost white ..... **B. pilosa** var. **minor**
1. Native species chiefly of the hills, mountains, ravines, valleys, etc.:
   2. Leaves commonly undivided:
      3. Inflorescence composed of a single head, pedunculate:
         4. Petioles equaling or surpassing the blades:
            5. Achenes winged ..... **B. mauiensis** var. **cuneatoides** and var. **Forbesiana**
            5. Achenes wingless ..... **B. molokaiensis**
         4. Petioles shorter than the blades:
            5. Leaves broadly cuneate at the base, coarsely dentate on each side with 3-5 teeth ..... **B. cuneata**
            5. Leaves rounded or cordate at the base, serrate on each side with 6-15 teeth ..... **B. molokaiensis**
      3. Inflorescence of many or few heads, cymose or paniculate-corymbose:
         4. Heads at flowering minute, only 2-4 mm. tall ..... **B. Degeneri**
         4. Heads at flowering larger:
            5. Leaves commonly slender-lanceolate or slender-oblong-lanceolate:
               6. Exterior involucral bracts 1-2 mm. long; heads numerous; many of the leaves divided; ligulate florets commonly 5 ..... **B. distans**
               6. Exterior involucral bracts 2-3 mm. long; heads hardly numerous; leaves commonly undivided; ligulate florets 7-8:
                  7. Achenial awns attached below apex of achene's body ..... **B. hawaiensis**
                  7. Achenial awns attached at very apex of achene's body ..... **B. Skottsbergii** var. **conglutinata**
            5. Leaves broader*
               6. Stems or branches more or less glaucous:
                  7. Exterior involucral bracts 1-2.5 mm. long:
                     8. The simple leaves ovate or rhomboid-ovate ..... **B. etenophylla**
                     8. The simple leaves oblong-lanceolate:
                        9. Achenial awns attached below apex of achene's body ..... **B. hawaiensis**
                        9. Achenial awns attached at very apex of achene's body ..... **B. Skottsbergii** var. **conglutinata**
                  7. Exterior involucral bracts about 4-5. mm. long ..... **B. asymmetrica**
               6. Stems or branches sometimes pale (**B. populifolia**) but not glaucous:
                  7. Leaves if simple then ovate, at base subcordate; petioles up to 6 or even 10 cm. long:
                     8. Leaves obtusely dentate; achenes narrowly linear, wingless, their body 7-12 mm. long ..... **B. populifolia**
                     8. Leaves sharply dentate; achenes broadly linear, often winged, their body 1.2-2 cm. long ..... **B. macrocarpa** var. **ovatifolia**
                  7. Leaves if simple then oblong-ovate, at base broadly cuneate; petioles about 1-3 cm. long ..... **B. Skottsbergii**

* Low, bushy, dwarfed forms of **B. graciloides** with simple leaves may be included here.

2. Leaves commonly divided:
3. Heads large, at flowering 5 cm. wide; styles surpassing the anthers by 6-10 mm., their branches abruptly long-caudate..... **B. cosmoides**
3. Heads smaller, commonly only the stylar branches projecting above the anthers:
4. Leaves bipinnately divided, the ultimate segments narrow (or in **B. waianensis** sometimes broad):
5. Plants decumbent or ascending:
6. Heads solitary or long-pedunculate..... **B. mauiensis** var. **lanaiensis**
6. Heads corymbose or paniculate..... **B. Hillebrandiana**
5. Plants erect:
6. Pedicels and minute peduncles densely and conspicuously whitish-pubescent..... **B. ctenophylla**
6. Pedicels or peduncles glabrous:
7. Achenes spirally coiled or twisted; leaf segments broadly linear or wider..... **B. waianensis**
7. Achenes straight or but little twisted, their body 8-13 mm. long, leaf segments linear or filiform, or rarely wider and conspicuously dentate with elongate and narrow teeth..... **B. Menziesii** and vars. **filiformis** and **leptodonta**
7. Achenes straight or nearly so, their body 6-9 mm. long; segments of principal leaves rhomboid-ovate or cuneately linear-lanceolate, their teeth not elongate..... **B. sandvicensis** var. **compositior**
7. Achenes straight or nearly so, their body about 3-7.5 mm. long:
8. Achenial bodies 6-7.5 mm. long..... **B. obtusiloba**
8. Achenial bodies about 3 mm. long..... **B. pulchella**
4. Leaves ternately or pinnately divided, or sometimes imperfectly bipinnate:
5. Plants decumbent or ascending:
6. Heads solitary or long-pedunculate..... **B. mauiensis** and vars. **cuneatoides** and **media**
6. Heads cymose or corymbose or paniculate:
7. Chaff scales up to 1 cm. long, surpassing the mature, biaristate achenes..... **B. Hillebrandiana**
7. Chaff scales much shorter and much surpassed by the commonly exaristate achenes:
8. Heads at flowering 11-15 mm. wide..... **B. graciloides**
8. Heads at flowering 6-8 mm. wide..... **B. Degeneri** var. **apioides** and f. **filicifolia**
5. Plants erect:
6. Principal awns of achenes commonly arising from below the apex of the achenial body and continuous with it, or lacking:
7. Achenes much twisted..... **B. waianensis**
7. Achenes straight or slightly curved:
8. Achenes narrow (0.5-1.7 mm. wide), black, wingless; heads at flowering 4-6 mm. tall and 1.5-2 cm. wide:
9. Heads numerous, often densely corymbose or paniculate; mature achenes commonly glabrous upon the faces and edges:
10. Many ligules very deeply incised at the apex; achenes commonly 1- to 3-setose at base, the setae elongate, erect, partly adnate..... **B. schizoglossa**
10. Ligules entire or only moderately dentate; elongate, partly adnate basal setae lacking:
11. Mature achenes conspicuously and intensely black; exterior involucral bracts only about 1.5 mm. long..... **B. micrantha** and vars. **kaalana** and **laciniata**
11. Mature achenes dull black (often obscurely so), not intensely nor conspicuously black:
12. Exterior involucral bracts only 1-2 mm. long..... **B. distans**
12. Exterior involucral bracts commonly 3-5 mm. long..... **B. conjuncta**
9. Heads fewer, cymose-corymbose or scattered here



BIDENS GRACILOIDES

a, flowering and fruiting branch, X0.69; *b*, *c*, exterior involucral bracts, X5.5; *d*, *e*, interior involucral bracts, X5.5; *f*, ligule, X5.5; *g*, palea, X5.5; *h*, disc floret, X5.5; *i*, achene, X5.5; all from C. N. Forbes 2435 0, type of *B. graciloides*, Hb. Bishop Mus.

and there; mature achenes dull black, setose on the edges.....**B. waimeana**

8. Achenes broader, brownish or brownish-black, often winged; heads at flowering 7-15 mm. tall and 2-3 cm. wide:

9. Heads at flowering 7-8 mm. tall and about 3 cm. wide; involucral bracts subequal, about 6 mm. long; ray florets 1-1.6 cm. long; disc florets 15-20 .....**B. macrocarpa**

9. Heads at flowering 8-15 mm. tall and about 2 or barely 2.5 cm. wide; outer bracts of involucre commonly smaller than inner and usually 1.5-3 mm. long; ray florets 6-9 mm. long; disc florets 30-45 .....**B. magnidisca**

6. Achenial awns lacking or the principal ones commonly arising from the apex itself:

7. Exterior bracts of the immature involucre reflexed; interior involucre conspicuous and to that of *Cosmos bipinnata* Cav. similar.....**B. amplectens**

7. Exterior bracts of immature involucre erect or spreading:

8. Heads commonly solitary, peduncles up to 11 cm. long, exterior bracts highly foliaceous.....**B. valida**

8. Heads and exterior bracts otherwise:

9. Achenes spirally coiled or strongly twisted:

10. Achenes commonly coiled through 3-5 revolutions.....**B. torta**

10. Achenes commonly coiled through 0.6-2 revolutions:

11. Cauline leaves 3- to 5-parted:

12. Heads numerous, small, at flowering 3.5-6 mm. tall and about 0.9-1.5 (more rarely -2) cm. wide:

13. Leaflets more often ovate-lanceolate or widely oblong-lanceolate, at apex more often subobtuse or only shortly acuminate, when young commonly clothed with yellow or even reddish hairs .....**B. fulvescens**

13. Leaflets lanceolate short- or long-acuminate, from the first green:

14. Principal leaves (petioles included) 5-13 cm. long.....**B. Wiebkei**

14. Principal leaves (petioles included) 1-2.5 dm. long.....**B. Forbesii**

12. Heads few, at flowering larger, 6-12 mm. tall and ± 2 cm. wide; principal leaves (including petioles) 1-2.5 dm. long.....**B. campylotheca** and var. **nematocera**

11. Cauline leaves commonly 5- to 7-parted:

12. Lower leaflets of cauline leaves often alternate; achenes narrowly linear, toward apex narrowly elongate.....**B. cervicata**

12. Lower leaflets of cauline leaves commonly opposite; achenes only weakly narrowed above:

13. Internodes long; leaves few and large; heads few, when expanded at flowering 3-4 cm. wide.....**B. campylotheca** var. **pentamera**

13. Internodes short; leaves commonly somewhat numerous, of medium size; heads commonly very numerous, a single herbarium specimen bearing 50-200, these when expanded at flowering only about 1.5-2 cm. wide.....**B. waianensis**

9. Achenes straight or curved or only weakly twisted:

10. Branches of inflorescence widely spreading, 1-headed; internodes of stem and branches commonly long.....**B. campylotheca** and vars. **nematocera** and **pentamera**

10. Habit otherwise:
    11. Principal leaves commonly 3-parted:
        12. Leaflets narrowly lanceolate, crenate-serrate, terminal one long-attenuate at apex; heads not numerous..... **B. asplenioides**
        12. Leaflets lanceolate or ovate (and not rather elongate unless heads are numerous), acutely serrate, terminal one apically acute or acuminate but not long-attenuate:
            13. Heads at flowering minute, 6-8 mm. wide and 4-5 mm. tall..... **B. Degeneri** var. **apioides**
            13. Heads at flowering larger:
                14. Stem and branches acutely tetragonal, herbaceous above:
                    15. Lateral leaflets commonly sessile; achenial bodies 10-16.5 mm. long:
                        16. Exterior involucral bracts 1.5-2 (rarely -2.5) mm. long; achenes about 0.7-0.8 mm. wide, awnless..... **B. personans**
                        16. Exterior involucral bracts 2-7 (commonly 4-6) mm. long; achenes about 1 mm. wide, commonly awned..**B. conjuncta**
                    15. Lateral leaflets of larger principal leaves petiolulate; achenial bodies 6-10 mm. long:
                        16. Heads densely aggregated, those of dry herbarium specimens commonly touching each other, borne at same or nearly same level..... **B. coartata**
                        16. Heads scattered, those of dry herbarium specimens rarely touching each other, borne at different levels..... **B. sandvicensis** and var. **caduca**
                14. Stem and branches rounded-tetragonal, hardly herbaceous above:
                    15. Mature achenes more or less twisted; exterior involucral bracts shorter by half than inner ones..... **B. asymmetrica**
                    15. Mature achenes straight or curved, not twisted:
                        16. Exterior involucral bracts commonly almost or sometimes fully equal to inner ones in length..... **B. waimeana**
                        16. Exterior involucral bracts a third or half shorter than inner ones..... **B. graciloides**
    11. Principal leaves more often 5-parted:
        12. Heads 2- to 5-aggregated, borne on slender long erect naked branches, separately pedunculate with peduncles most often 2-5.5 cm. long; at flowering 7-8 mm. tall..... **B. Stokesii**
        12. Heads cymose-corymbose or paniculate, peduncles or pedicels most often shorter; at flowering 4.5-7 mm. tall:
            13. Achenes commonly glabrous, or sparsely setose above:
                14. Leaflets narrowly lanceolate, crenate-serrate, the terminal one apically long-attenuate..... **B. asplenioides**
                14. Leaflets moderately or widely linear:

BIDENS SCHIZOGLOSSA

a, flowering and fruiting branch, X0.68; *b*, exterior involucral bract, X6.8; *c*, interior involucral bract, X6.8; *d*, *e*, rays, X6.8; *f*, palea, X6.8; *g*, disc floret, X6.8; *h*, *i*, achenes, X6.8; all from W. A. and C. B. Setchell, near Huehue, Isl. Hawaii, June 24, 1924, type in Herb. Univ. Calif.

15. Pedicels and peduncles glabrous ..... **B. salicoides**
15. Pedicels and peduncles whitish-pubescent ..... **B. ctenophylla**
14. Leaflets lanceolate or ovate, acutely serrate, the terminal one apically acute or acuminate but not long-attenuate ..... **B. sandvicensis**

13. Achenes moderately or copiously setose upon the margins:
14. Plants commonly 2-5 dm. tall:
15. Inflorescence manifestly exserted above the leaves ..... **B. micranthoides**
15. Inflorescence (of an entire plant and not of only a branch) not manifestly exserted above the leaves ..... **B. graciloides**
14. Plants commonly 4-9 dm. tall:
15. In habit approaching *B. sandvicensis;* terminal leaflet of a larger leaf in all about 22- to 26-toothed ..... **B. sandvicensis var. setosa**
15. In habit approaching *B. asymmetrica;* terminal leaflet of a larger leaf in all about 6- to 16-toothed ..... **B. waimeana**

TYPICAL HAWAIIAN SPECIES

BIDENS SCHIZOGLOSSA Sherff

HUEHUE BIDENS; KOKOOLAU

Bidens schizoglossa Sherff in Bot. Gaz. 88:288. 1929.

Shrub about 8 dm. high with glabrous stem and subquadrangular somewhat purplish glabrous branches having their internodes much shorter than the leaves. Leaves trifoliolate, glabrous, membranous, 7-13 cm. long, with slender petioles 1.5-3.5 cm. long; leaflets strongly toothed or in the case of the upper leaves sometimes entire, acuminate, the sessile or sparingly petiolulate lateral leaflets lanceolate with very oblique base and 4-6 cm. long and 1.5-2.5 cm. wide, the terminal leaflet more often ovate-lanceolate and conspicuously petiolulate with blade 5-7 cm. long and up to 4 cm. wide. Heads on persistently pubescent more often only 2-4 mm. long pedicels, extremely numerous in corymbose panicle, radiate, when flowering about 7-10 mm. wide and 3.5-5.5 mm. high. Involucre pubescent, with 4 or 5 exterior bracts up to about 1.5 mm. long and having apices often subobtuse, and with inner bracts lanceolate and about 2.5-3 mm. long. Ray florets 5 or rarely 6, yellow, with obovate to somewhat cuneate 3-4 mm. long ligule having apex moderately or often deeply and conspicuously cut into 2 or 3 lobes of which the apex is more or less acute. Maturing achenes linear, 7-8 mm. long and about 1.2 mm. wide, flat, dark brown, glabrous, shallowly few-striate, with margins often beset with 1-3 elongate erect up-growing setae and with top beset just below or almost at apex with 2 teeth which are naked or armed with 1-3 retrorse bristles. Chaff glabrous, slightly longer than achenes.

Type Locality: "Near Huehue, Island of Hawaii."

Local Range: Growing among the old lava flows near Huehue, District of Kona, Hawaii.

Extra Range: Known only from the type locality. Closely related to *Bidens micrantha* Gaud.

BIDENS POPULIFOLIA Sherff
POPLAR-LEAVED BIDENS; KOKOOLAU
Bidens populifolia Sherff in Bot. Gaz. 86:438. 1928.

Annual or possibly perennial glabrous more or less simple or even much branched herb becoming 8 dm. high, with quadrangular stem. Leaves almost always simple, membranous, quite pale, scarcely ciliate, up to 2 dm. long (the slender petioles 1.5 cm. to even 10 cm. long), with mostly undivided ovate-cordate to deltoid-cordate 3-10 cm. long blades having margins serrate with rounded obtuse teeth and with base often subcordate or also obliquely truncate and with apex subobtuse to acute or rarely more or less subacuminate; leaves very rarely 2- to 3-partite, more or less irregularly so, with terminal leaflet broadly rhomboid-lanceolate or ovate-lanceolate or orbicular, with lateral ones oblique and rhomboid-ovate. Heads not numerous, borne in corymbose open clusters, radiate, on slender pedicels 5 cm. long or less, when flowering about 3 cm. wide and 7-9 mm. high. Involucral bracts subequal, 5-7 on outside, spreading-reflexed, glabrous, sometimes oblong-linear to spatulate-obovate with obtuse to rounded apex, 1.5-3.5 mm. long; inner bracts lanceolate, minutely pubescent toward apex, 5-6.5 mm. long, straight. Ray florets, 8-6 or rarely 5, yellow, with oblong-linear to oblanceolate 12-15 mm. long ligules having apex usually 3-dentate. Chaff red toward apex. Achenes narrowly linear, straight, wingless, almost black, obcompressed, with one face obscurely about 8-striate, with margins sparsely ciliate with erect hair, with body 7-12 mm. long and 0.8-1.1 mm. wide, with apex usually biaristate with slender teeth 1 mm. long or less bearing retrorse hair.

Type Locality: "Grassy slope back of small Hawaiian church on east side of Kahana Valley, Isl. Oahu."

Local Range: Locally common on the slopes on both sides of Kahana Valley, Oahu.

Extra Range: Not known elsewhere.

BIDENS SALICOIDES Sherff
WILLOW-LEAVED BIDENS; KOKOOLAU
Bidens salicoides Sherff in Bot. Gaz. 86:437. 1928.

Erect glabrous branched shrubby perennial becoming perhaps 6 dm. high, with stem and branches more or less quadrangular. Leaves becoming about 15 cm. long, the principal ones pinnately but often irregularly 2- to 5-parted, membranous, having narrow petiole 5 cm. long or less; segments lanceolate to broadly linear, with margins entire or occasionally with a few coarse teeth and often obscurely revolute, with the terminal segment up to 8 cm. long and 12 mm. wide but with lateral ones smaller and sessile or subsessile; upper leaves usually ternate or even simple. Heads subcorymbose, radiate, when flowering about 15 mm. wide and 6-8 mm. high, on slender 1-4 cm. long pedicels. Involucre glabrate, of usually 6-7 narrowly linear about 3-4 mm. long outer bracts having black central vein projecting into subacute coriaceous apex, and with inner bracts lanceolate-ovate and a little longer. Ray florets 3 or 4 or perhaps even 5, yellow, linear-elliptic, 12-14 mm. long, with apex obscurely denticulate. Achenes linear, flat, bluish-black, not winged, straight or moderately twisted, mostly glabrous, with about 16 longitudinal obscure grooves, with body 7-10 mm. long and apex bearing 1 or 2 naked awns 1 mm. long or less or awns absent.

BIDENS POPULIFOLIA

a, main portion of younger plant, X0.6; *b*, leaf from lower part of same, X0.6; *c*, exterior involucral bract, X3.6; *d*, inferior involucral bract, X3.6; *e*, ligulate floret, X1.8; *f*, palea, X3.6; *g*, disc floret, X6; *h*, *i*, achenes, X3.6; all from Degener, Bean, Topping, and Apo 2514, cotype in Hb. Boiss.

BIDENS SALICOIDES

a, flowering and fruiting branch, X0.6; *b*, exterior involucral bract, X3.6; *c*, interior involucral bract, X3.6; *d*, ligulate floret, X3; *e*, palea, X3.6; *f*, disc floret, X6; *g*, *h*, exterior and inferior achenes, X3.6; all from Degener and Wiebke 3084 (*a* from cotype in Hb. Berl. and the rest from first type sheet in Hb. Field Mus.).

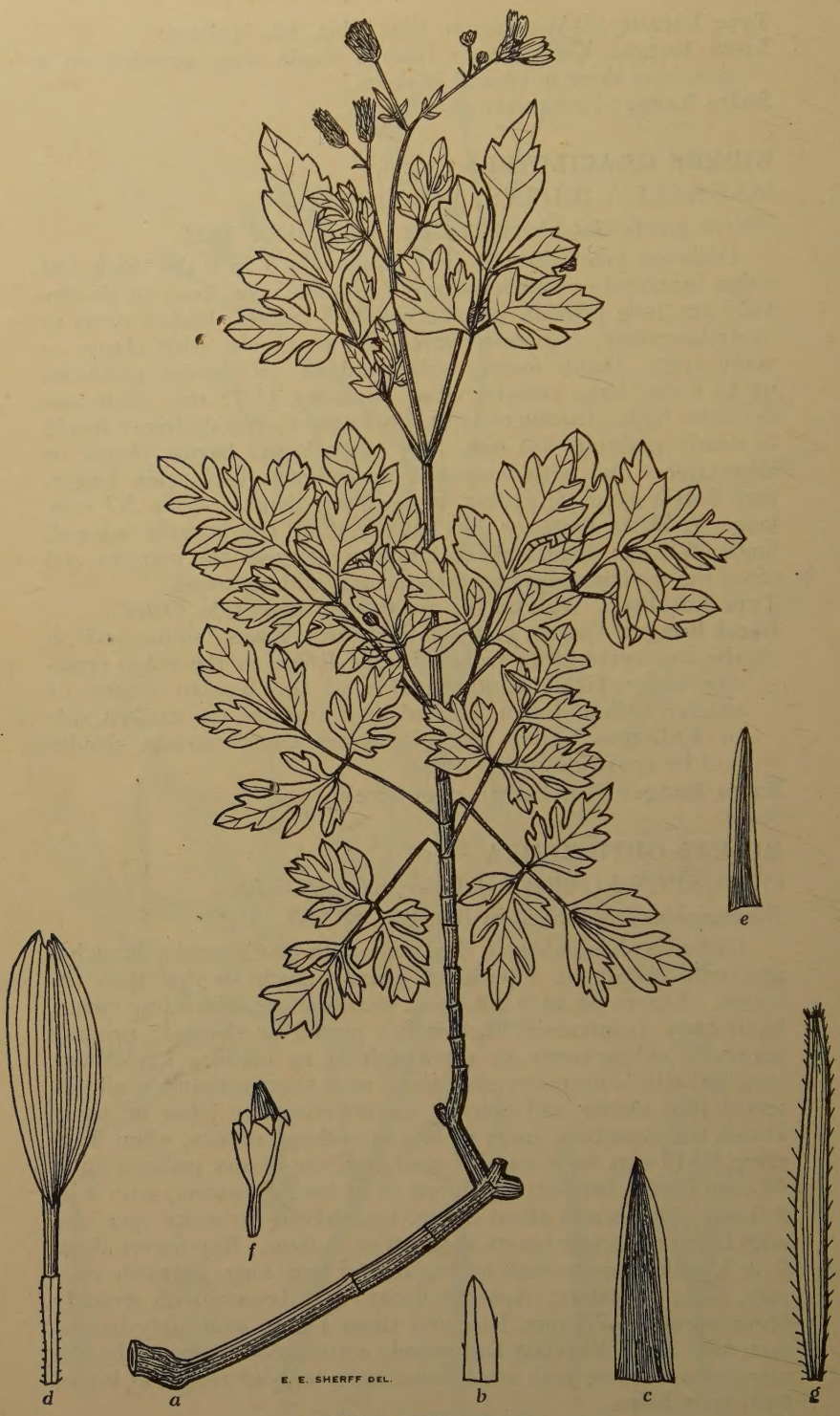
Type Locality: "Arid region, East Ohia, Isl. Molokai."
Local Range: Known only from a single plant growing on a mountain slope in central Molokai.
Extra Range: Not known elsewhere.

BIDENS GRACILOIDES Sherff
MAUNALUA BIDENS; KOKOOLAU
Bidens graciloides Sherff in Bot. Gaz. 76:159. 1923.

Glabrous erect shrubby herb commonly 5 to 6 dm. high and either branched or simple below. Leaves 3-5 cm. long, on slender 1-2.5 cm. long petioles, pinnate with 3-5 leaflets; leaflets ovate to ovate-lanceolate, crenate-serrate, 1.2-4 cm. wide, with obtuse or acute apex. Heads loosely subcorymbose, on slender peduncles up to 6 cm. long, radiate, when flowering 11-15 mm. wide and 5-7 mm. high. Involucre with 4-6 linear to oblong-linear hispid to nearly glabrous 2-3 mm. long outer bracts having obtuse or acute apices and with lanceolate inner bracts half again longer. Ray florets about 5, yellow, with elliptic dentate ligule 5-7 mm. long. Achenes more or less curved, flat, not actually winged, linear, 6-7 mm. long and 0.6-1 mm. wide, with the margins and often the median ridges sparsely setose, without awns.
Type Locality: "Waialae Iki, ridge, right-hand side, Oahu".
Local Range: On the comparatively dry, grassy slopes and on the fog-swept cliffs from Waialae Ridge to the ridge opposite Koko Head, southern side of the Koolau Range of eastern Oahu. In an isolated, dry area on the eastern side of Kuliouou Valley, the plants are conspicuously slender and lie prostrate in the grass.
Extra Range: Not known elsewhere.

BIDENS OBTUSILOBA Sherff
OBTUSELY-LOBED BIDENS; KOKOOLAU
Bidens obtusiloba Sherff in Bot. Gaz. 88:289. 1929.

Glabrous shrub about 6 dm. high, with quadrangular branches and with the lower internodes usually much shorter than the leaves. Leaves up to 8 cm. long, membranous, obsoletely ciliate, bipinnately (commonly biternately) parted or divided; primary segments oblong-ovate to often deltoid in outline, 1.5-3.5 cm. long and a little narrower, the lateral ones short-petiolulate, all dissected into obtuse and apically minute-cuspidate lobes or teeth. Heads not numerous, more or less corymbose, radiate, when flowering 10-15 mm. wide and 5-7 mm. high, on slender pedicels up to 18 mm. long. Involucre glabrous or at base pubescent, with 4 or 5 linear outer bracts about 2 mm. long having subacute apex and with lanceolate inner bracts about twice as long. Ray florets about 4 or 5, yellow, more than or less than 5 mm. long, narrowly obovate, 2- or 3-dentate. Achenes linear, dark brown, with strongly obcompressed 6-7.5 mm. long and about 1 mm. wide body having each side about 8-striate and merely setose toward top while the margins are setose with erect hairs, apex without teeth but hispid with erect hairs.
Type Locality: "Niu Ridge, Island of Oahu."
Local Range: Found along the moderately dry, grassy and partly shrubby slopes of Niu Ridge, eastern Oahu.
Extra Range: Not known elsewhere. Apparently closely related to *Bidens pulchella* (Less.) Schz. Bip.



BIDENS OBTUSILOBA

a, flowering and fruiting branch, X0.74; *b*, exterior involucral bract, X7.4; *c*, interior involucral bract, X7.4; *d*, ray floret, X7.4; *e*, palea, X7.4; *f*, disc floret, X7.4; *g*, achene, X7.4; all from D. LeRoy Topping 2941, type in Herb. Univ. Calif.